APPENDIX A:
DEQ LOCAL REALIGNMENT SEGMENTS PRELIMINARY ANALYSIS

Many alternative alignment segments were developed for the preliminary alternative analyses for the March 2007 Document and the Draft EIS (February 2008). Some alternative alignment segments were developed and would apply only to Alternative 2. Likewise, some segments were developed and would apply only to Alternative 4. Some alternative alignment segments could apply to either alternative where Alternative 2 and Alternative 4 are in the same right-of-way. The acreages and mileage values provided in the Appendix A alternative descriptions and tables were accurate and correct for the preliminary analysis but have not been updated for the Final EIS.

Development of Alternative 4 (Possible Agency-Proposed Local Realignments)

During the development of Alternative 4, DEQ considered eight possible local realignments to address specific scoping issues (**Figure A1**). The eight local realignments are presented below as segments A1, A2, B1, B2, C1, C2, D, and E. In assembling Alternative 4 as a whole, DEQ selected segments A1, B2, C1, the north half of D, and E. As discussed in Section 2.5, the DEQ Director may select some of the segments included in Alternative 4 as mitigations to address land use and visual resource issues identified during scoping and in the analysis of Alternative 2. Therefore, all of the segment descriptions are included here for information. DEQ's analysis of these segments, and the information that helped in the selection of segments for Alternative 4, are presented here.

West Great Falls Realignment Segment A1

Alternative segment A1 is an alignment that would diverge from the southern 23 miles of Alternative 2, to avoid diagonal crossing of farm land, where possible. Where Alternative 2 would go directly north out of the Great Falls Substation, segment A1 would take a west-northwesterly path out of Great Falls paralleling the railroad and WAPA 230-kV transmission line, making use of an existing transportation corridor. The segment A1 alignment would head west and then north along the railroad and rejoin Alternative 2 where it leaves 8th Road. Segment A1 is the only segment that would run south and west of Benton Lake National Wildlife Refuge.

Shooting Sports Complex Realignment Segment A2

Approximately 1½ miles north of Great Falls, Alternative 2 would turn directly west for a mile and then run directly north along the west side of the Great Falls Shooting Sports Complex. Segment A2 is a 4.2-mile-long alignment that would continue directly north from Great Falls along the edge of cropland and parallel to the access road on the east side of the Great Falls Shooting Sports Complex. The alignment would parallel the existing 161-kV NWE transmission line between Great Falls and Havre. Segment A2 would rejoin Alternative 2 where it crosses Highway 87. This alignment would minimize crossing of farmland.

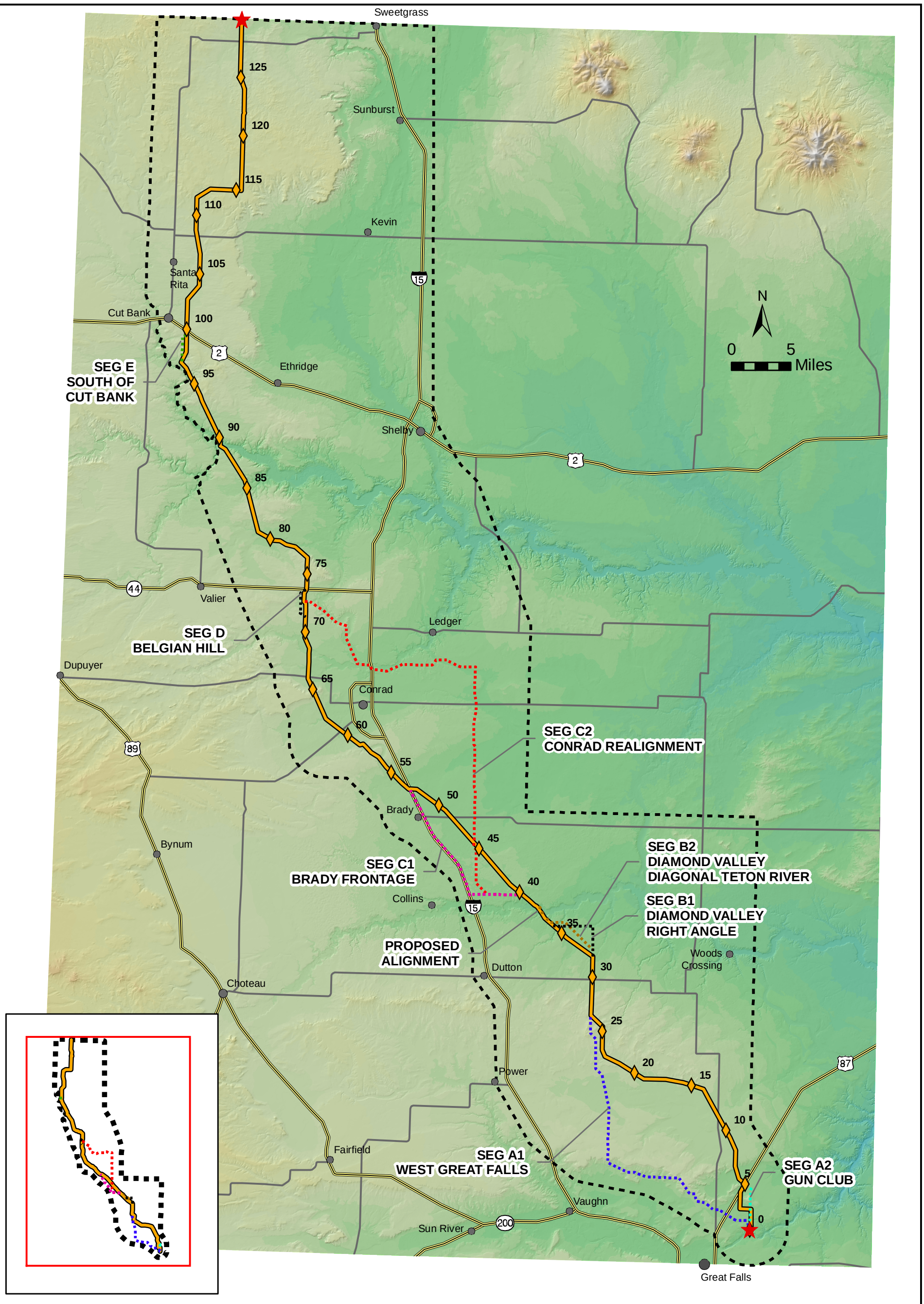

FIGURE A1
AGENCY PROPOSED LOCAL REALIGNMENT SEGMENTS

LEGEND

- ALT2 - ALIGNMENT
- ALT2 - MILEPOSTS
- SEGMENT A1 WEST GREAT FALLS
- SEGMENT A2 SHOOTING SPORTS COMPLEX
- SEGMENT B1 DIAMOND VALLEY RIGHT ANGLE
- SEGMENT B2 DIAMOND VALLEY AND TETON RIVER
- SEGMENT C1 BRADY FRONTAGE ROAD
- SEGMENT C2 CONRAD REALIGNMENT
- SEGMENT D BELGIAN HILL
- SEGMENT E SOUTH OF CUT BANK
- CITIES AND TOWNS
- ALIGNMENT END AND EXIT POINTS
- STUDY AREA BOUNDARY
- MAJOR HIGHWAYS
- SECONDARY ROADS

GIS map by Ed Madej -TTEMI-HE FigA1_MATL_ALT4_Agency_Realignments_021607.mxd

Diamond Valley Right Angle Realignment Segment B1

Segment B1 is a 5.9-mile-long alignment addressing the area in Teton county 2 to 5 miles south of the Teton River. In the headwaters of Kinnerely Coulee, segment B1 would run directly north where Alternative 2 turns northwest. After running directly north for approximately 2½ miles, segment B1 would turn directly west running approximately 3 miles until it would rejoin Alternative 2 in the vicinity of Hunt Coulee. This alignment would avoid diagonal crossing of farm land.

Diamond Valley and Teton River Realignment Segment B2

Segment B2 is a 6.5-mile-long alignment that would diverge from Alternative 2 at the same location as segment B1. Where the segment B2 alignment intersects the Alternative 3 alignment and existing NWE 115-kV transmission line, it would parallel the line for approximately 3 miles until it would turn west to join Alternative 2 just south of the Teton River. Segment B2 would cross Hunt Coulee approximately ¾ mile north of the Alternative 2 crossing and ¼ mile north of the segment B1 crossing. Segment B2 would then cross the Teton River just east of the location described in Alternative 2. Segment B2 would address a landowner concern over opening a new corridor rather than paralleling an existing line which already has disrupted farming practices in some fields.

Brady Frontage Road Realignment Segment C1

Segment C1 is a 15-mile-long realignment that would diverge from Alternative 2 approximately 8 miles southeast of Brady. Segment C1 would run directly west from the Alternative 2 along the northern edge of the Teton River bank to the Interstate 15 frontage road, and follow the frontage road for about 11 miles past the town of Brady to rejoin Alternative 2 about two miles north of Brady. Segment C1 would closely parallel the existing transportation corridor of Interstate 15 and the frontage road. Segment C1 would decrease crossing of farmland and avoid paralleling one pipeline.

Conrad Realignment Segment C2

Segment C2 is a 41-mile-long realignment that would diverge from Alternative 2 at the same location as segment C1. After approximately 3 miles running directly west, segment C2 would turn northwest for approximately 1½ miles, then turn directly north for approximately 18 miles, then turn directly west, heading for the Dry Fork of the Marias River. After the alignment crosses the existing WAPA 230-kV transmission line, approximately 2 miles south of Ledger, it intersects the river. The alignment generally parallels the Dry Fork of the Marias until it would cross Interstate 15, then head northwest along Big Flat Coulee for approximately 8 miles. The alignment would turn due west for approximately 1 mile before rejoining Alternative 2, approximately 4 miles north of the Dry Fork of the Marias River crossing. This segment would minimize diagonal crossing of farm land, avoid crossing farm land by traversing uncultivated land, and avoid residences and paralleling of pipelines.

N

0 0.4 Miles

44

2

1

0

FIGURE A2
SEGMENT D
BELGIAN HILL

LEGEND

- ALT2 - ALIGNMENT
- SEGMENT D BELGIAN HILL
- MILEPOSTS
- RESIDENCES OR FARMSTEADS WITHIN 1 MILE OF ALIGNMENTS

EASEMENTS

- CONSERVATION RESERVE PROGRAM

- CITIES AND TOWNS
- ALIGNMENT END AND EXIT POINTS
- STUDY AREA
- EXISTING TRANSMISSION LINES
- MAJOR HIGHWAYS
- SECONDARY ROADS
- RIVERS AND STREAMS

GIS map by Ed Madej TTEMI-HE FigA2_MATL_Alt4_SegD_021507.mxd

Belgian Hill Realignment Segment D

Segment D is a 2.8-mile-long realignment that would move the alignment slightly west from the Alternative 2 alignment for 2 miles, just north of Belgian Hill, farther away from four residences (**Figure A2**). The alignment would generally parallel Alternative 2. Segment D would result in greater potential for general local acceptance. This segment would reduce visual impacts. Some diagonal crossing of farmland would be required.

South of Cut Bank Realignment Segment E

Segment E is a 2.5-mile-long realignment that would move the alignment approximately ¼ mile west for a 2-mile stretch, just south of the Alternative 2 intersection with Highway 2. Segment E would move the alignment to follow property boundaries better and is located farther away from residential areas and result in greater potential for general local acceptance. Segment E would generally parallel Alternative 2.

Land Use Segment Analysis

Table A1 shows how many miles of cropland and CRP would be crossed by each agency-proposed local realignment segment in comparison to the same segment of Alternative 2.

TABLE A1
AGENCY SEGMENT CROPLAND COMPARISON
TO ALTERNATIVE 2 SEGMENTS

	Linear Miles	Acres in 500-Foot Wide Buffer	Miles Crossing CRP or Cropland
Segment A1 **(West Great Falls)**	**27.3**	1,652	11.7
Alternative 2 Corresponding segment	**26.8**	1,621	17.2
Segment A2 **(Shooting Sports Complex)**	**4.2**	255	2.4
Alternative 2 Corresponding segment	**5.0**	301	2.4
Segment B1 **(Diamond Valley Right Angle)**	**5.9**	357	5.4
Alternative 2 Corresponding segment	**4.2**	256	3.7
Segment B2 **(Diamond Valley & Teton River)**	**6.5**	393	5
Alternative 2 Corresponding segment	**5.9**	358	5.2
Segment C1 **(Brady Frontage)**	**15.0**	904	9.3
Alternative 2 Corresponding segment	**13.3**	804	12.6
Segment C2 **(Conrad Realignment)**	**41.0**	2,481	28.3
Alternative 2 Corresponding segment	**33.0**	1,999	27.5
Segment D **(Belgian Hill)**	**2.8**	170	2.8
Alternative 2 Corresponding segment	**2.4**	73	2.2
Segment E **(South of Cut Bank)**	**2.5**	149	0
Alternative 2 Corresponding segment	**2.3**	140	.7

Notes: Alternative 4 would require the use of monopole on cropland or CRP. The overall Alternative 2 alignment crosses 92.7 miles of cropland and CRP.

Table A2 shows the types of land use crossed by Alternatives 2 and 3, and how many miles of farm land are crossed parallel to farming rows, perpendicular to farming rows, or at a diagonal to farming rows.

TABLE A2
TYPES OF LAND USE CROSSED BY ALTERNATIVES 2 AND 3 (MILES)

	Alternative 2				Alternative 3			
	Parallel[a]	Perpendicular[b]	Diagonal[c]	Total	Parallel[a]	Perpendicular[b]	Diagonal[c]	Total
Irrigated cropland	1.4	0	0.1	1.5	0	0	6.8	6.8
Non-irrigated cropland	34.5	3.9	52.8	91.2	27.3	0	63.6	90.9
Rangeland	6.3	1.8	25.5	33.6	5.2	0.2	16.2	21.6
Road/Right of Way	0.2	0.9	0.2	1.3	0.1	0	0.2	0.3
Residential	0	0	0	0	0	0	0.1	0.1
Forest	0	0	0	0	0	0	0.1	0.1
Riparian	0.6	0	1.3	1.9	0.1	0	1.2	1.3
Water	0	0	0	0	0	0	0.1	0.1
Total Miles	43.0	6.6	79.9	129.5	32.7	0.2	88.3	121.2

Notes:

[a] parallel to north and south

[b] perpendicular to north and south

[c] diagonal to north and south

Sources: Orthophotographs 2005 (Montana NRIS 2006a); NRIS 2000; MATL 2006b; field verification; photographic interpretation

The agency-proposed local realignment segments were developed, in part, to reduce the impacts on farming from the proposed transmission line. The numbers of miles of crossings parallel to, perpendicular to, and diagonal to irrigated cropland, non-irrigated cropland, and rangeland are summarized for corresponding segments of Alternative 2 and agency-proposed local realignments (**Table A3**).

TABLE A3
MILES OF PARALLEL, PERPENDICULAR, AND DIAGONAL ACROSS CROPLAND AND RANGELAND ALTERNATIVE 2 AND CORRESPONDING AGENCY LOCAL REALIGNMENT SEGMENT

	Alternative 2				Agency-proposed Local Realignment Segment			
	Parallel[a]	Perpendicular[b]	Diagonal[c]	Total	Parallel[a]	Perpendicular[b]	Diagonal[c]	Total
Segment A1 — West Great Falls								
Irrigated	--	--	--	--	--	--	--	--
Non-irrigated	5.4	1.0	10.8	17.2	6.6	1.6	3.5	11.7
Rangeland/ Native	1.0	1.0	6.5	8.5	1.9	2.7	10.7	15.3
Other	0	0.9		0.9	0.1	--	0.1	0.2
Total Miles	**6.4**	**2.9**	**17.3**	**26.6**	**8.6**	**4.3**	**14.3**	**27.2**
Segment A2 — Great Falls Shooting Sports Complex								
Irrigated	-	-	-	-	-	-	-	-
Non-irrigated	1.7	0.5	0.2	2.4	1.7	0.1	0.6	2.4
Rangeland/ Native	1.1	0.0	0.7	1.8	1.1	--	0.7	1.8
Other	0.0	0.0	0.0	0.0	--	--	--	--
Total Miles	**2.8**	**0.5**	**0.9**	**4.2**	**2.8**	**0.1**	**1.3**	**4.2**
Segment B1 — Diamond Valley Right Angle								
Irrigated	--	--	--	--	--	--	--	--
Non-irrigated	--	--	3.7	3.7	2.5	2.9	--	5.4
Rangeland/ Native	--	--	0.3	0.3	--	0.4	--	0.4
Other	--	--	--	--	--	0.1	--	0.1
Total Miles	**--**	**--**	**4.0**	**4.0**	**2.5**	**3.4**	**--**	**5.9**
Segment B2 — Diamond Valley Diagonal-Teton River								
Irrigated	0.0	0.0	0.0	0.0	-	-	-	-
Non-irrigated	0.0	0.0	5.2	5.2	0.5	0.8	3.7	5.0
Rangeland/ Native	0.0	0.0	0.8	0.8	0.2	0.5	0.7	1.4
Other	0.0	0.0	0.2	0.2	0.0	0.0	0.1	0.1
Total Miles	**0.0**	**0.0**	**6.2**	**6.2**	**0.7**	**1.3**	**4.5**	**6.5**
Segment C1 — Brady Frontage								
Irrigated	--	--	--	--	--	--	--	--
Non-irrigated	--	0.5	12.1	12.6	--	3.8	5.5	9.3
Rangeland/ Native	--	0.1	0.6	0.7	--	0.8	0.0	0.8
Other	--	--	0.2	0.1	--	--	4.9	4.9
Total Miles	**--**	**0.6**	**12.9**	**13.4**	**--**	**4.6**	**10.4**	**15.0**

TABLE A3
MILES OF PARALLEL, PERPENDICULAR, AND DIAGONAL ACROSS CROPLAND AND RANGELAND ALTERNATIVE 2 AND CORRESPONDING AGENCY LOCAL REALIGNMENT SEGMENT

	Alternative 2				Agency-proposed Local Realignment Segment			
	Parallel[a]	Perpendicular[b]	Diagonal[c]	Total	Parallel[a]	Perpendicular[b]	Diagonal[c]	Total
Segment C2 — Conrad Realignment								
Irrigated	0.9	--	0.0	0.9	1.2	0.5	-	1.7
Non-irrigated	3.3	--	23.2	26.6	14.8	6.5	5.3	26.6
Rangeland/ Native	0.6	--	3.9	4.5	1.1	1.2	9.8	12.1
Other	0.1	--	0.9	0.9	0.2	-	0.4	0.6
Total Miles	**4.9**	**0.0**	**28.0**	**32.9**	**17.3**	**8.2**	**15.5**	**41.0**
Segment D — Belgian Hill								
Irrigated	0.4	--	--	0.4	--	--	--	--
Non-irrigated	1.0	--	0.6	1.6	2.8	--	--	2.8
Rangeland/ Native	0.2	--	0.1	0.1	--	--	--	--
Other	0.1	--	--	0.1	--	--	--	--
Total Miles	**1.7**	**0**	**0.7**	**2.4**	**--**	**--**	**--**	**2.8**
Segment E — South of Cut Bank								
Irrigated	--	--	--	--	--	--	--	--
Non-irrigated	0.7	--	--	0.7	--	--	0	--
Rangeland/ Native	0.8	--	0.8	0.8	2.4	--	--	2.4
Other	--	--	--	0	--	--	--	--
Total Miles	**1.5**	**0**	**0.8**	**1.5**	**--**	**--**	**--**	**2.4**

Notes:

[a] parallel to north and south

[b] perpendicular to north and south

[c] diagonal to north and south

-- Not applicable

Sources: Orthophotographs 2005 (Montana NRIS 2006a); MATL 2006b; field verification; photographic interpretation .

The following observations were made:

- Segment A1 (West Great Falls) is 0.6 miles longer than the segment it would replace in Alternative 2, however, it reduces the diagonal crossing of cropland from 10.8 miles to 3.5 miles.
- Segment A2 (Great Falls Shooting Sports Complex) increases the diagonal crossing of non-irrigated cropland from 0.2 in Alternative 2 to 0.6 miles in Alternative 4.
- Segment B1 (Diamond Valley Right Angle) is 1.9 miles longer than the segment it would replace in Alternative 2, however, it eliminates diagonal crossing of cropland, compared to 3.7 miles of diagonal crossing in Alternative 2 for this segment and moves the transmission line alignment onto existing utility corridors or other land uses (non-farm).
- Segment B2 (Diamond Valley Diagonal - Teton River) is 0.3 miles longer than the segment of Alternative 2 it would replace, but it reduces the diagonal crossing of cropland from 5.2 miles to 3.7 and shifts the crossing to parallel (0.5 miles) or perpendicular (0.8 miles).
- Segment C1 (Brady Frontage) is 1.6 miles longer than the segment it would replace in Alternative 2. It would reduce the diagonal crossing of cropland from 12.1 miles to 5.5 miles.
- Segment C2 (Conrad Realignment) is nearly 8 miles longer than the segment of Alternative 2 it would replace (41 miles compared to 32.9 miles), however, it would substantially reduce the diagonal crossing of cropland from 23.2 miles to 5.3 miles. Most (14.8 miles) of the cropland crossed would be parallel to the north-south orientation of crop rows. Approximately 6.5 miles would be crossed perpendicular to the rows. Additionally, more of the alignment (12.1 miles) would cross native vegetation or rangeland, compared to Alternative 2 which has 4.5 miles crossing those vegetation types.
- Segment D (Belgian Hill) is 0.4 miles longer than the segment it would replace in Alternative 2, however, it would remove all the diagonal crossing of cropland in this segment and increase the distance of parallel crossing from 1.4 miles to 2.8 miles. The parallel crossings or alignment near the edges of the fields would not interfere with farming activities as much as diagonal crossings.
- Segment E (South of Cut Bank) is 0.9 miles longer than the segment it would replace in Alternative 2, however, it would remove all crossings of cropland (including diagonal) and move the alignment onto native or rangeland vegetation.

Table A4 compares how many miles of transmission line cross CRP land or cropland under each agency-proposed local realignment segment and how many acres would be affected. Segments B1, C2, and D would result in a slight increase in acres removed from production because of the longer length of the line under these segments (see **Table A4)**.

TABLE A4
Acres of Production in CRP or Cropland Affected by Monopole Structures in Agency-proposed Local Realignments Compared to Alternative 2

	Alternative 2		Agency-proposed Local Realignment	
Segment	**Miles**	**Acres[a]**	**Miles**	**Acres[a]**
A1 West Great Falls	17.2	1.8	11.7	1.2
A2 Great Falls Shooting Sports Complex	2.4	0.3	2.4	0.3
B1 Diamond Valley Right Angle	3.7	0.4	5.4	0.6
B2 Diamond Valley Diagonal-Teton River	5.2	0.5	5.0	0.5
C1 Brady Frontage	12.6	1.3	9.3	1.0
C2 Conrad Realignment	27.5	2.8	28.3	3.0
D Belgian Hill	2.0	0.2	2.8	0.3
E South of Cut Bank	0.7	0.1	0.0	0.0

Notes:

[a] Acres rounded to nearest 0.01. Calculation based on 0.01 acres per structure at a structure every 500 feet (10.5 structures per mile)

Sources: Orthophotographs, 2005 (Montana NRIS 2006a), NRIS 2000, MATL 2006b; field verification; photographic interpretation

Some segments (B1 - Diamond Valley Right Angle, C1 – Conrad Realignment and D - Belgian Hill) increase the length of power line crossing farmland and CRP slightly (see **Table A4**) over Alternative 2 for those segments.

Conservation Easements and Special Management Areas

Linear miles of lands under federal/state special management and those lands currently under federal or state conservation easements (wetland easements, CRP, and FWP easements) are summarized in **Table A5** for each alignment. Segments A1 and A2 would eliminate crossing the Great Falls Shooting Sports Complex. Some agency-proposed local realignments would increase the number of miles crossing CRP over corresponding Alternative 2 segments they would replace.

TABLE A5 MILES OF FEDERAL/STATE SPECIAL MANAGEMENT AREAS AND CONSERVATION EASEMENTS CROSSED			
	Alternative 2 Corresponding Segment	**Alternative 3**	**Agency-proposed Local Realignments**
State Land (FWP) – Great Falls Shooting Sports Complex			
Segment A1 (West Great Falls)	0.73	--	0
Segment A2 (Great Falls Shooting Sports Complex)	0	0.51	0.76
Segment B1 (Diamond Valley Right Angle)	--	--	--
Segment B2 (Diamond Valley Diagonal-Teton River)	--	--	--
Segment C1 (Brady Frontage)	--	--	--
Segment C2 (Conrad Realignment)	--	--	--
Segment D (Belgian Hill)	--	--	--
Segment E (South of Cut Bank)	--	--	--
Montana State Trust Land (DNRC)			
Segment A1 (West Great Falls)	3.69	--	2.56
Segment A2 (Great Falls Shooting Sports Complex)	0.12	--	0.08
Segment B1 (Diamond Valley Right Angle)	0.00	--	0.00
Segment B2 (Diamond Valley Diagonal-Teton River)	1.24	--	1.24
Segment C1 (Brady Frontage)	1.14	--	2.68
Segment C2 (Conrad Realignment)	1.70	--	4.03
Segment D (Belgian Hill)	0.00	--	0.00
Segment E (South of Cut Bank)	0.00	--	0.00
Conservation Easements			
Segment A1 (West Great Falls)	(CRP) 5.32 (Stewardship) 0.12	--	10.04
Segment A2 (Great Falls Shooting Sports Complex)	0.00	--	0.00
Segment B1 (Diamond Valley Right Angle)	0.00	--	0.00
Segment B2 (Diamond Valley Diagonal-Teton River)	1.54	--	1.54
Segment C1 (Brady Frontage)	0.00	--	3.10
Segment C2 (Conrad Realignment)	2.16	--	4.17
Segment D (Belgian Hill)	1.36	--	1.48
Segment E (South of Cut Bank)	1.04	--	0.90

Notes:
-- = not applicable

Planned Land Use

The Segment A1 West Great Falls local alignment crosses the planned Kyles Addition subdivision. No residences are under construction or completed in this subdivision.

Wetlands Segment Analysis

The length of each segment and the wetlands affected by each segment are shown in **Table A6**, along with the length of the corresponding segment of Alternative 2 which it could replace.

TABLE A6
WETLANDS AFFECTED BY SEGMENTS
AGENCY-PROPOSED LOCAL REALIGNMENT

Alternative Comparison	Segment Length	Palustrine PEM	Palustrine PUS, PUB, & PAB	Lacustrine	Riverine	Total
	(miles)	(acres)	(acres)	(acres)	(acres)	(acres)
West Great Falls Segment A1	27.3	13.25	0.43	0.0	0.0	13.68
Corr. Alt. 2 Segment	26.8	15.72	1.07	0.78	0.0	17.57
Great Falls Shooting Sports Complex Segment A2	4.2	0.0	0.13	3.21	0.0	3.34
Corr. Alt. 2 Segment	5.0	4.13	0.0	0.78	0.0	4.91
Diamond Valley Right Angle Segment B1	5.9	<1 Est.	ND	ND	<1 Est.	ND
Corr. Alt. 2 Segment	4.2	<1 Est.	ND	ND	<1 Est.	ND
Diamond Valley Diagonal-Teton River Segment B2	6.5	1-2	ND	ND	2-3	ND
Corr. Alt. 2 Segment	5.9	1-2	ND	ND	2-3	ND
Brady Frontage Segment C1	15.0	0.0	0.0	0.0	0.0	0.0
Corr. Alt. 2 Segment	13.3	10.12	1.98	0.0	0.0	12.10
Conrad Realignment Segment C2	41.0	18.10	2.01	0.0	0.0	20.11
Corr. Alt. 2 Segment	33.0	13.75	1.98	0.0	0.0	15.73
Belgian Hill Segment D	2.8	0.0	0.0	0.0	0.0	0.0
Corr. Alt. 2 Segment	2.4	0.0	0.41	0.0	0.0	0.41
South of Cut Bank Segment E	2.5	0.0	0.0	0.0	0.0	0.0
Corr. Alt. 2 Segment	2.3	0.0	0.0	0.0	0.0	0.0

Notes:

Alt. Alternative
Corr. Corresponding
PEM Palustrine Emergent wetlands
PUS Palustrine Unconsolidated Shore wetlands
PUB Palustrine Unconsolidated Bottom wetlands
PAB Palustrine Aquatic Bed wetlands
Est. estimated using the 2005 aerial photographs
ND No Data

Potential impacts to wetlands for all eight local realignment segments were evaluated using the wetland data provided in **Table A6**. Total potential wetlands recorded along each local realignment segment were compared to the total wetlands recorded for the corresponding segment of Alternative 2. The total wetland acres was also segregated into four main wetland categories (2 palustrine classes, 1 lacustrine, and 1 riverine) to better evaluate the types of wetlands that each segment may impact. Total wetland acreage does not include any wetlands that may exist in Teton County for the portion of the segments where no official wetland data currently exist. The 2005 National Agricultural Imagery Program aerial photographs were used to visually identify observable wetlands along the local realignment segments in Teton County and to estimate the approximate number of wetlands for these alignments. Even though the wetland acreage could not be quantified from the aerial photographs, it was determined that no single large wetland or concentration of wetlands existed that could not be spanned using 500 foot span lengths.

Potential impacts to wetlands for the local realignment segments were compared only to the corresponding segments of Alternative 2 for which each could substitute. As was determined for the entire analysis area, the majority of the wetlands along all local realignment segments are classified as palustrine, emergent wetlands (PEM).

Segment A1 (West Great Falls) The A1 segment traverses around the southern and western sides of Benton Lake NWR area and would potentially impact 3.89 fewer acres of wetlands, compared to the corresponding segment of Alternative 2. Several smaller areas with palustrine and lacustrine wetlands exist directly north of Great Falls (Black Horse Lake area) and along the western side of Benton Lake NWR. A1 would impact fewer wetlands primarily because it is located along steeper slopes compared to crossing a more flat bench area. No riverine wetlands are delineated along segment A1 facility location. However, segment A1 crosses the Lake Creek channel in Teton County and could potentially impact a small riverine wetland (possibly about 1 acre) at that location.

Segment A2 (Great Falls Shooting Sports Complex Realignment) This 4.2 mile long segment runs north from the Great Falls 230-kV switch yard along the edge of cropland and parallel to the access road to the Great Falls Shooting Sports Complex. The Segment A2 centerline crosses over an actively used gun club, but would not be located over any existing or planned buildings. The segment A2 facility location would potentially impact 1.57 fewer acres of wetlands compared to the corresponding segment of Alternative 2. The primary difference between these two alignments was that the segment A2 realignment would cross a larger portion of the Black Horse Lake Flat that has been mapped as a lacustrine wetland.

Segment B1 (**Diamond Valley Right Angle)** This 5.9 mile long B1 segment is located in Diamond Valley area of Teton County, approximately 2 to 5 miles south of the Teton River. The types and amounts of wetlands that would be impacted within the 500 foot wide facility location of segment B1 are very similar to those that occur along the 4.2 mile long corresponding Alternative 2 portion. Both segment B1 and the corresponding Alternative 2 centerlines would cross Hunt Coulee; segment B1 would cross this coulee at a straight east to west angle, while the Alternative 2 would cross Hunt Coulee at a southeast to northwest angle. Hunt Coulee has palustrine emergent wetlands (estimated to be less than one acre) and a small area of riverine wetlands (estimated to be less than one acre) in the bottom of the coulee. These wetland areas could be spanned causing minimal impacts to wetlands under both the B1 segment and Alternative 2 alignments.

Segment B2 (Diamond Valley and Teton River) This 6.5 mile long segment B2 is also located in the Diamond Valley area of Teton County, but would utilize the same alignment as Alternative 3 for approximately 3.25 miles where it would parallel the existing NWE 115-kV transmission line. Segment B2 would cross Hunt Coulee approximately ¾ mile north of the Alternative 2 crossing and ¼ mile north of the segment B1 crossing of Hunt Coulee. This alignment would also extend further north and includes a modified crossing of the Teton River that avoids some cropland. The types and amounts of wetlands that would be impacted within the 500 foot wide facility location for segment B2 are very similar to those that occur along the 5.9 mile long corresponding Alternative 2 portion. Both alternative alignments would cross small areas with palustrine emergent wetlands (estimated at one to two acres) and a small area of riverine wetlands (estimated at two to three acres) in the bottom of Hunt Coulee and the Teton River. All wetland areas visually identified on the 2005 aerial photographs for segment B2 could be spanned.

Segment C1 (Brady Frontage Road) Segment C1 is a 15.0 mile long alignment that runs directly east - west along the northern edge of the Teton River bank and then parallels the Interstate 15 frontage road for approximately 11 miles, connecting back with the Alternative 2 alignment just north of Brady, Montana. Segment C1 would potentially impact 12.1 fewer acres of wetlands compared to the Alternative 2 alignment through this area. There are no wetlands of any type mapped along the Brady Frontage Road alignment. Several areas with palustrine wetlands (total of 12.1 acres) exist along the corresponding segment of Alternative 2 through this area.

Segment C2 (Conrad Realignment) Segment C2 is a 41.0 mile long alignment that runs around the Town of Conrad on the east and north sides. Segment C2 takes off from Alternative 2 at the same location as segment C1. Both Alternative C1 and C2 segments would be in the same alignment for approximately 3.25 miles where segment C2 would begin to run north. This alternative alignment would travel north for approximately 20 miles where it would turn west and continue for approximately 18 miles where it

would rejoin Alternative 2. This alternative alignment would cross several major coulees (South Pondera, Pondera, Favot, and Big Flat) and the Dry Fork Marias River.

Segment C2 would potentially impact 4.38 more acres of total wetlands compared to the corresponding Alternative 2 alignment through this area. The main reason for the increased number of wetlands crossed by segment C2 is the higher proportion of coulees and unfarmed drainages that were used by this alternative in the avoidance of farmed land. Small areas with palustrine and riverine wetlands exist along most of the major coulees and along the Dry Fork Marias River crossing. Segment C2 also crosses slightly larger and more defined drainages due to its more eastern location. Drainages generally flow west to east in this area and tend to have more defined channels as they flow toward the Missouri River.

Segment D (Belgian Hill) Segment D is a relatively short (2.8 mile) alignment located in the Belgian Hill area. This alternative segment generally parallels Alternative 2, but is located approximately ½ mile to the west. This alignment segment was developed primarily to minimize visual impacts to four residences located along the Alternative 2 alignment. Segment D would potentially impact 0.41 fewer acres of palustrine wetlands compared to Alternative 2 through this locale.

Segment E (South of Cut Bank) Segment E is a relatively short (2.5 mile) segment located in an area southeast of Cut Bank. This alternative segment also parallels the Alternative 2 alignment approximately ½ mile to the west. This alignment segment was developed primarily to minimize visual impacts to residences located along the Alternative 2 alignment and to avoid paralleling a buried gathering pipeline for the oil wells in the local area. There are no mapped wetlands along either segment E or the corresponding Alternative 2 alignment in this locale.

Vegetation Segment Analysis

Rangeland vegetation, such as grassland, improved pasture, seeded grasslands, shrubland, badland, riparian and wetlands, and forested cover types, would be removed by the construction of access roads and structures, and at construction staging areas. Maintenance activities would not likely result in additional ground disturbance. Linear miles of rangeland cover types affected by alternative are presented in **Table A7**. Disturbance resulting from staging areas would be similar for Alternatives 2 and 3.

Agency-proposed local realignment segments total approximately 38.5 miles. The comparable segments of Alternative 2 total almost 20 miles (**Table A8**), nearly doubling the grassland the rangeland cover types under alternative segments. The increased crossing in rangeland cover types would result in more tower structures and access roads, thus increasing rangeland impacts. Disturbance due to maintenance activities would also increase over the life of the project due to increased structure and road

placement in rangeland and vegetation (**Table A9**). Disturbance resulting from staging areas would be similar to those of Alternatives 2 and 3.

TABLE A7
Native Vegetation Cover Types Crossed by Alternatives 2, 3, and 4

Rangeland Cover Types	Alternative 2		Alternative 3		Agency-proposed Local Realignments	
	Miles	Total Land Cover (percent)	Miles	Total Land Cover (percent)	Miles	Total Land Cover (percent)[a]
Grassland/ Shrubland	33.6	25.9	21.6	17.8	A1 = 15.3 A2 = 1.8 B1 = 0.4 B2 = 1.3 C1 = 0.8 C2 = 12.0 D = 2.8 E = 2.5	A1 = 56.2 A2 = 42.2 B1 = 7.3 B2 = 19.9 C1 = 5.2 C2 = 29.1 D = 99.0 E = 100.0
Riparian	1.9	1.5	1.3	1.1	A1 = 0.2 A2 = 0.03 B1 = 0.1 B2 = 0.2 C1 = 0.05 C2 = 1.0 D = 0.04 E = 0.0	A1 = 0.7 A2 = 0.7 B1 = 2.2 B2 = 2.8 C1 = 0.3 C2 = 2.3 D = 0.01 E = 0.0
Forest (Cottonwood)	0.0	0.0	0.1	0.1	B2 = 0.04[b]	B2 = 0.6
Total	35.5	27.4	23.0	19.0	--	--
Total Line Length	129.9	--	121.6	--	--	--

Notes:
a Percent of segment..
b Found only in segment B_2
Source: Orthophotographs 2005 (Montana NRIS 2006a) analysis of land cover in vegetation analysis area, October 2006.
-- not applicable

TABLE A8 LINEAR MILES OF VEGETATION CHANGE BETWEEN ALTERNATIVE 2 AND AGENCY-PROPOSED LOCAL REALIGNMENTS		
Native Vegetation Cover Types	**Alternative 2 (miles)**	**Agency-proposed Local Realignments (miles)**
Rangeland	A1 = 8.5 A2 = 1.8 B1 = 0.3 B2 = 0.8 C1 = 0.6 C2 = 4.5 D = 0.3 E = 1.6	A1 = 15.3 A2 = 1.8 B1 = 0.4 B2 = 1.3 C1 = 0.8 C2 = 12.0 D = 2.8 E = 2.5
Riparian	A1 = 0.0 A2 = 0.0 B1 = 0.2 B2 = 0.2 C1 = 0.1 C2 = 0.8 D = 0.1 E = 0.0	A1 = 0.2 A2 = 0.03 B1 = 0.1 B2 = 0.2 C1 = 0.05 C2 = 1.0 D = 0.04 E = 0..0
Forest (Cottonwood)	No Data	B2 = 0.4 [a]

Note:
a Found only in segment B_2
Source: Orthophotographs 2005 (Montana NRIS 2006a) of land cover in vegetation analysis area, October 2006

TABLE A9 [d] ESTIMATED ACRES OF DISTURBANCE DUE TO H-FRAME STRUCTURES IN RANGELAND VEGETATION						
Rangeland Cover Types	**Alternative 2**			**Agency-proposed Local Realignments**		
	Miles[a]	Number of Structures[b]	Acres[c]	Miles	Number of Structures	Acres
Grassland/ Shrubland	18.4	121	0.1	36.9	244	0.2
Riparian	1.4	9	<0.01	1.6	11	<0.01
Total	19.8	130	0.1	38.5	255	0.2

Notes:
a Segment total.
b Average 800-foot span between H-frame structures.
c Based on 36 square feet occupied by an H-frame structure.
[d] New values were updated in 2008 but have not been incorporated into this table.

Riparian Vegetation
The effects to riparian vegetation from the agency-proposed local realignments would be similar to those of Alternative 2 because both alternatives cross similar amounts of riparian habitat (**Table A9**).

Species of Concern
The effects on species of concern from agency-proposed local realignments would be the same as Alternative 2 because both alternatives cross similar amounts of riparian habitat where these species are likely to occur (**Table A10**).

Weed Control
The agency-proposed local realignments would cross more native vegetation than Alternative 2 (**Table A8**). This increase in land area potentially exposed to disturbance and noxious weed invasion would require greater diligence, expense, and coordination to successfully implement a noxious weed control plan (**Table A9**). The MATL Noxious Weed and Invasive Plant Control Plan (**Appendix C**) would adequately reduce the increased risk of noxious weed spread in the analysis area.

Wildlife Segment Analysis

Big Game Species
Impacts on big game species would not be expected. Pronghorn and mule deer does with fawns could be displaced by activities during late spring and early summer, but disturbance within a given portion of the line would be temporary and animals could easily use adjacent habitat during disturbance periods. Activities would not disturb wintering animals as the construction activities would occur during the spring and summer months. The proposed and alternative transmission line alignments would cross through mule deer winter range and there would be some permanent loss of habitat as a result of structures and access roads (see **Table A10).** This habitat loss would not impact mule deer as this is a minor loss relative to the amount of available habitat within the region.

TABLE A10 MULE DEER WINTER RANGE IMPACTED BY ALTERNATIVES				
MULE DEER WINTER RANGE	Alternative			
	2	3	2 Corresponding to Agency-proposed Local Realignments[a]	Agency-proposed Local Realignment by Segments[b]
Miles of Mule Deer Winter Range Bisected by Transmission Line	Alternative 2 Segment A 19	20	A1 = 1.8 A2 = 1.8 B1 = 0 B2 = 1.0 C1 = 0.67 C2 = 9.3 D = 0 E = 0	A1 = 4.2 A2 = 1.8 B1 = 0.9 B2 = 3.0 C1 = 4.8 C2 = 8.8 D = 0 E = 0

Notes:
a Segment of the Alternative 2 alignment that corresponds with the agency-proposed local realignment segment.
b Agency-proposed local realignment segments that correspond to the Alternative 2 segments.

Threatened and Endangered Segment Analysis

The alternative alignments traverse the known habitat range of four Species of Concern and one federally threatened species. **Table A11** lists the linear miles of special status species' habitat range along each of the two action alternatives and local realignments.

TABLE A11 LINEAR MILES OF SPECIAL STATUS SPECIES' HABITAT RANGE BY ALTERNATIVE AND AGENCY-PROPOSED LOCAL REALIGNMENTS					
Common Name	**State Rank**	**Alternative**			
		2	3	2 Corresponding to Agency-proposed Local Realignments[a]	Agency-proposed Local Realignment by Segments[b]
Black-crowned night-heron	S3B	11.2	9.1	A1 = 11.2 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 2.6 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0
Black-necked stilt	S3, S4B	11.2	9.1	A1 = 11.2 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 2.6 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0

TABLE A11
LINEAR MILES OF SPECIAL STATUS SPECIES' HABITAT RANGE BY ALTERNATIVE AND AGENCY-PROPOSED LOCAL REALIGNMENTS

Common Name	State Rank	Alternative			
		2	3	2 Corresponding to Agency-proposed Local Realignments[a]	Agency-proposed Local Realignment by Segments[b]
Burrowing owl	S2B	4.2	3.9	A1 = 4.2 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 0 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0
Ferruginous hawk	S2B	6.5	0	A1 = 6.5 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 5.8 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0
Peregrine falcon	S2B	2.5	2.2	A1 = 0 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 0 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0
Total for All species	--	19.9	11.3	A1 = 17.7 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 8.4 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0

Notes:

Source: MTNHP. 2005. GIS Analyses of Element Occurrence Data. Montana Natural Heritage Program, Helena, Montana. Available at: **http://nhp.nris.state.mt.us/mbd**

State: S2 = Imperiled because of rarity, or because of other factors demonstrably making it very vulnerable to extinction throughout its range; B = a state rank modifier indicating breeding status for a migratory species; S3 = vulnerable because of rarity, or found in restricted range even though it may be abundant at some of its locations; S4 = apparently secure, though it may be quite rare in parts of its range, especially at the periphery; S1 = critically imperiled because of extreme rarity, or because of some factor of its biology making it especially vulnerable to extirpation; SH = Historical, known only from records over 50 years ago; may be rediscovered; N = non-breeding.

a Segment of the Alternative 2 alignment that corresponds with the agency-proposed local realignment segment.
b Agency-proposed local realignment segments that correspond to the Alternative 2 segments.

TABLE A12 [c]
TAX BENEFIT ESTIMATES FOR ALTERNATIVES AND SEGMENTS

	Alignment Length (Miles)	Value $/Mi.	Estimated Value in County (BxC)	Class 9 Tax Rate (Valuation Ratio): 12%	Taxable Value (DxE)	Avg. Rural Mill Levy	Property Tax (FxG)
Cascade							
Alternative 2	12.76	$363,284	$4,635,504	0.12	$556,260	0.50412	$280,422
Alternative 3	12.31	$363,284	$4,472,026	0.12	$536,643	0.50412	$270,533
Alternative 4							
Segment A1 - Alt 2	12.75	$363,284	$4,631,871	0.12	$555,825	0.50412	$280,202
Segment A1 - Alt 4	19.8	$363,284	$7,193,023	0.12	$863,163	0.50412	$435,138
Chouteau							
Alternative 2	5.87	$363,284	$2,132,477	0.12	$255,897	0.43959	$112,490
Alternative 3	10.21	$363,284	$3,709,130	0.12	$445,096	0.43959	$195,660
Alternative 4							
Segment A1 - Alt 2	5.87	$363,284	$2,132,477	0.12	$255,897	0.43959	$112,490
Segment A1 - Alt 4	0	$363,284	$0	0.12	$0	0.43959	$0
Glacier							
Alternative 2	40.41	$363,284	$14,680,306	0.12	$1,761,637	0.53745	$946,792
Alternative 3	37.34	$363,284	$13,565,025	0.12	$1,627,803	0.53745	$874,863
Alternative 4	40.41	$363,284	$14,680,306	0.12	$1,761,637	0.53745	$946,792
Pondera							
Alternative 2	45.69	$363,284	$16,598,446	0.12	$1,991,814	0.52162	$1,038,970
Alternative 3	44.44	$363,284	$16,144,341	0.12	$1,937,321	0.52162	$1,010,545
Alternative 4							
Segment C1 - Alt 2	4.11	$363,284	$1,493,097	0.12	$179,172	0.52162	$93,460
Segment C1 - Alt 4	7.12	$363,284	$2,586,582	0.12	$310,390	0.52162	$161,906
Segment C2 - Alt 2	28.86	$363,284	$10,484,376	0.12	$1,258,125	0.52162	$656,263
Segment C2 - Alt 4	34.66	$363,284	$12,591,423	0.12	$1,510,971	0.52162	$788,153

TABLE A12 [c]
TAX BENEFIT ESTIMATES FOR ALTERNATIVES AND SEGMENTS

	Alignment Length (Miles)	Value $/Mi.	Estimated Value in County (BxC)	Class 9 Tax Rate (Valuation Ratio): 12%	Taxable Value (DxE)	Avg. Rural Mill Levy	Property Tax (FxG)
Teton							
Alternative 2	25.16	$363,284	$9,140,225	0.12	$1,096,827	0.4991	$547,426
Alternative 3	17.32	$363,284	$6,292,079	0.12	$755,049	0.4991	$376,845
Alternative 4							
Segment A1 - Alt 2	8.13	$363,284	$2,953,499	0.12	$354,420	0.4991	$176,891
Segment A1 - Alt 4	7.47	$363,284	$2,713,731	0.12	$325,648	0.4991	$162,531
Segment C1 - Alt 2	4.12	$363,284	$1,496,730	0.12	$179,608	0.4991	$89,642
Segment C1 - Alt 4	7.89	$363,284	$2,866,311	0.12	$343,957	0.4991	$171,669
Segment C2 - Alt 2	4.12	$363,284	$1,496,730	0.12	$179,608	0.4991	$89,642
Segment C2 - Alt 4	6.29	$363,284	$2,285,056	0.12	$274,207	0.4991	$136,857
Notes:							
Sources: Mullen 2006							
Montana Department of Revenue 2004							

Notes:
a Mullen 2006
b Montana Department of Revenue 2004
c. New values were updated in 2008 but have not been incorporated into this table.

$/Mi. = dollars per mile

Socioeconomics Segment Analysis

The socioeconomic impacts described above are essentially equal for all of the alternatives and segments with the exception of differences in the estimated property tax revenue available to each affected county depending on the mileage of the line that would ultimately be constructed within each county's jurisdiction (**Table A12**).

Cultural Resources Segment Analysis

The Class 1 cultural resource searches resulted in the identification of three previously recorded sites considered eligible for the NRHP in sections along the agency-proposed local realignment segments. These sites include the Rainbow Dam Road, an historic transmission line, and the Burlington Northern-Santa Fe Railroad. There are 20 sites where NRHP-eligibility has not been determined, is unknown, or is unresolved. This group includes six tipi ring sites, two lithic scatter sites, two prehistoric camp sites, an historic road or trail, five homesteads, two historic irrigation systems, one historic trash dump, and one historic mining site.

Two NRHP-eligible sites, 24CA416 the Rainbow Dam Road and 24CA1040 an historic transmission line just north of the Missouri River, are located in sections containing both segment A1 and segment A2. The sections crossed by segment A1 contains three of the tipi ring sites, the two lithic scatter sites, the two prehistoric camp sites, three of the homesteads, and the historic mining site in the category of undetermined, unknown, or unresolved NRHP eligibility.

There are no previously recorded cultural resource sites in sections along either segment B1 or segment B2.

One section along segment C1 contains one tipi ring site of undetermined NRHP eligibility. Several sections along segment C2 contain two of the tipi ring sites, two of the homesteads, one of the historic irrigation systems, and the one historic trash dump in the category of undetermined, unknown, or unresolved NRHP eligibility.

Two sections along segment D contain the historic road or trail and one of the historic irrigation systems both of undetermined NRHP eligibility. Two sections along segment E contain the NRHP-eligible Site 24GL191, the Great Northern Railroad – now part of the Burlington Northern-Santa Fe.

Visuals Segment Analysis

Alternative 4 was developed by comparing eight segments that originated and ended at various locations off of Alternative 2 (**Table A13**). Compared to the corresponding segment from Alternative 2, there are fewer residences in the immediate foreground and foreground (0 to ¼ mile and ¼ to ½ mile) of segments A1, A2, B1, B2, C2, and D compared to the corresponding Alternative 2 segments. The differences are all fewer than 5 residences, except A1 (A1 = 13 and corresponding Alternative 2 A1 = 28). Segment E and the corresponding Alternative 2 segment are the same. Segment C1 has a considerably more residences than the corresponding Alternative 2 segment (C1 = 66 versus corresponding Alternative 2 = 0).

Travel corridor comparison (½ to 1 mile) shows that segments A1, A2, and D have a shorter lineal mileage from the major travel routes in the area than do the corresponding Alternative 2 segments. Segment A1 is approximately 3 miles shorter than its corresponding Alternative 2 segment and the other segments are within 1.5 lineal miles of their corresponding Alternative 2 segments. Segment C1 has a considerable amount more lineal mileage within ½ to 1 mile than the corresponding Alternative 2 segment (C1 = 12.38 miles versus corresponding Alternative 2 C1 = 4.83 miles).

All recreation sites were not compared, but those that were are similar in visual impacts.

In summary, segment A1 has less of a visual impact than the corresponding Alternative 2 segment. The corresponding Alternative 2 segment C1 has considerably smaller visual impact than the segment C1. Transmission line alignments in segments D and E were located in consultation with local residents to reduce visual impacts.

TABLE A13
Comparison of Visual Impacts
Alternative 2, 3, and 4 Segments

Alternative	Segment	Number of Residences (Points)			Recreation – Benton Lake (Miles)	Recreation – State Lands[a] (Miles)	Recreation – Lewis & Clark Trail (Lineal Mileage)			Travel Corridor[b] (Lineal Mileage)
		0 to ¼	¼ to ½	½ to 1	Within One Mile	Miles Crossed	0 to ¼	¼ to ½	½ to 1	½ to 1
2		30	60	91	9.42	0.73	7.94	3.39	6.90	19.61
3		34	71	124	8.90	0.49	7.72	2.30	4.96	21.39
4	A1	10	3	29	--	0.77	0.50	0.52	1.07	4.17
	A2	5	8	4	--	--	--	--	--	2.00
	B1	1	0	2	--	--	--	--	--	--
	B2	2	0	1	--	--	--	--	--	--
	C1[c]	9	57	41	--	--	0.64	0.55	0.89	12.38
	C2[c]	8	16	22	--	--	0.50	0.51	0.79	3.34
	D	4	1	2	--	--	--	--	--	2.50
	E	2	3	3	--	--	0.47	0.50	0.50	1.14
2	A1	9	19	34	--	0.73	0.74	1.15	2.05	7.95
	A2	5	10	13	--	--	--	--	--	3.17
	B1	2	0	1	--	--	--	--	--	--
	B2	2	0	1	--	--	--	--	--	--
	C1	0	0	0	--	--	0.70	1.00	1.38	4.83
	C2	9	20	10	--	--	0.70	1.00	1.38	1.88
	D	4	0	2	--	--	--	--	--	2.45
	E	2	3	4	--	--	--	--	--	1.14

Notes:
a Does not include the conservation easement located north of the Missouri River at Great Falls Substation (Lewis and Clark Greenway Conservation Easement)
b Interstate 15, U.S. Highways 2 and 87, and Montana State Highway 44
c C1 and C2 do not have the same endpoints.
-- not available

Diamond Valley and Teton River Realignment Segment B2

Segment B2 is a 6.5-mile-long alignment that would diverge from Alternative 2 at the same location as segment B1. Where the segment B2 alignment intersects the Alternative 3 alignment and existing NWE 115-kV transmission line, it would parallel the line for approximately 3 miles until it would turn west to join Alternative 2 just south of the Teton River. Segment B2 would cross Hunt Coulee approximately ¾ mile north of the Alternative 2 crossing and ¼ mile north of the segment B1 crossing. Segment B2 would then cross the Teton River just east of the location described in Alternative 2. Segment B2 would address a landowner concern over opening a new corridor rather than paralleling an existing line which already has disrupted farming practices in some fields.

Brady Frontage Road Realignment Segment C1

Segment C1 is a 15-mile-long realignment that would diverge from Alternative 2 approximately 8 miles southeast of Brady. Segment C1 would run directly west from the Alternative 2 along the northern edge of the Teton River bank to the Interstate 15 frontage road, and follow the frontage road for about 11 miles past the town of Brady to rejoin Alternative 2 about two miles north of Brady. Segment C1 would closely parallel the existing transportation corridor of Interstate 15 and the frontage road. Segment C1 would decrease crossing of farmland and avoid paralleling one pipeline.

Conrad Realignment Segment C2

Segment C2 is a 41-mile-long realignment that would diverge from Alternative 2 at the same location as segment C1. After approximately 3 miles running directly west, segment C2 would turn northwest for approximately 1½ miles, then turn directly north for approximately 18 miles, then turn directly west, heading for the Dry Fork of the Marias River. After the alignment crosses the existing WAPA 230-kV transmission line, approximately 2 miles south of Ledger, it intersects the river. The alignment generally parallels the Dry Fork of the Marias until it would cross Interstate 15, then head northwest along Big Flat Coulee for approximately 8 miles. The alignment would turn due west for approximately 1 mile before rejoining Alternative 2, approximately 4 miles north of the Dry Fork of the Marias River crossing. This segment would minimize diagonal crossing of farm land, avoid crossing farm land by traversing uncultivated land, and avoid residences and paralleling of pipelines.

Belgian Hill Realignment Segment D

Segment D is a 2.8-mile-long realignment that would move the alignment slightly west from the Alternative 2 alignment for 2 miles, just north of Belgian Hill, farther away from four residences (**Figure A2**). The alignment would generally parallel Alternative 2. Segment D would result in greater potential for general local acceptance. This segment would reduce visual impacts. Some diagonal crossing of farmland would be required.

N

0 0.4 Miles

44

2

1

0

FIGURE A2
SEGMENT D
BELGIAN HILL

LEGEND

- ALT2 - ALIGNMENT
- SEGMENT D BELGIAN HILL
- MILEPOSTS
- RESIDENCES OR FARMSTEADS WITHIN 1 MILE OF ALIGNMENTS

EASEMENTS

- CONSERVATION RESERVE PROGRAM

- CITIES AND TOWNS
- ALIGNMENT END AND EXIT POINTS
- STUDY AREA
- EXISTING TRANSMISSION LINES
- MAJOR HIGHWAYS
- SECONDARY ROADS
- RIVERS AND STREAMS

GIS map by Ed Madej TTEMI-HE FigA2_MATL_Alt4_SegD_021507.mxd

South of Cut Bank Realignment Segment E

Segment E is a 2.5-mile-long realignment that would move the alignment approximately ¼ mile west for a 2-mile stretch, just south of the Alternative 2 intersection with Highway 2. Segment E would move the alignment to follow property boundaries better and is located farther away from residential areas and result in greater potential for general local acceptance. Segment E would generally parallel Alternative 2.

Land Use Segment Analysis

Table A1 shows how many miles of cropland and CRP would be crossed by each agency-proposed local realignment segment in comparison to the same segment of Alternative 2.

TABLE A1
AGENCY SEGMENT CROPLAND COMPARISON
TO ALTERNATIVE 2 SEGMENTS

	Linear Miles	Acres in 500-Foot Wide Buffer	Miles Crossing CRP or Cropland
Segment A1 **(West Great Falls)**	**27.3**	1,652	11.7
Alternative 2 Corresponding segment	**26.8**	1,621	17.2
Segment A2 **(Shooting Sports Complex)**	**4.2**	255	2.4
Alternative 2 Corresponding segment	**5.0**	301	2.4
Segment B1 **(Diamond Valley Right Angle)**	**5.9**	357	5.4
Alternative 2 Corresponding segment	**4.2**	256	3.7
Segment B2 **(Diamond Valley & Teton River)**	**6.5**	393	5
Alternative 2 Corresponding segment	**5.9**	358	5.2
Segment C1 **(Brady Frontage)**	**15.0**	904	9.3
Alternative 2 Corresponding segment	**13.3**	804	12.6
Segment C2 **(Conrad Realignment)**	**41.0**	2,481	28.3
Alternative 2 Corresponding segment	**33.0**	1,999	27.5
Segment D **(Belgian Hill)**	**2.8**	170	2.8
Alternative 2 Corresponding segment	**2.4**	73	2.2
Segment E **(South of Cut Bank)**	**2.5**	149	0
Alternative 2 Corresponding segment	**2.3**	140	.7

Notes: Alternative 4 would require the use of monopole on cropland or CRP. The overall Alternative 2 alignment crosses 92.7 miles of cropland and CRP.

Table A2 shows the types of land use crossed by Alternatives 2 and 3, and how many miles of farm land are crossed parallel to farming rows, perpendicular to farming rows, or at a diagonal to farming rows.

TABLE A2
TYPES OF LAND USE CROSSED BY ALTERNATIVES 2 AND 3 (MILES)

	Alternative 2				Alternative 3			
	Parallel[a]	Perpendicular[b]	Diagonal[c]	Total	Parallel[a]	Perpendicular[b]	Diagonal[c]	Total
Irrigated cropland	1.4	0	0.1	1.5	0	0	6.8	6.8
Non-irrigated cropland	34.5	3.9	52.8	91.2	27.3	0	63.6	90.9
Rangeland	6.3	1.8	25.5	33.6	5.2	0.2	16.2	21.6
Road/Right of Way	0.2	0.9	0.2	1.3	0.1	0	0.2	0.3
Residential	0	0	0	0	0	0	0.1	0.1
Forest	0	0	0	0	0	0	0.1	0.1
Riparian	0.6	0	1.3	1.9	0.1	0	1.2	1.3
Water	0	0	0	0	0	0	0.1	0.1
Total Miles	43.0	6.6	79.9	129.5	32.7	0.2	88.3	121.2

Notes:

[a] parallel to north and south

[b] perpendicular to north and south

[c] diagonal to north and south

Sources: Orthophotographs 2005 (Montana NRIS 2006a); NRIS 2000; MATL 2006b; field verification; photographic interpretation

The agency-proposed local realignment segments were developed, in part, to reduce the impacts on farming from the proposed transmission line. The numbers of miles of crossings parallel to, perpendicular to, and diagonal to irrigated cropland, non-irrigated cropland, and rangeland are summarized for corresponding segments of Alternative 2 and agency-proposed local realignments (**Table A3**).

TABLE A3
MILES OF PARALLEL, PERPENDICULAR, AND DIAGONAL ACROSS CROPLAND AND RANGELAND ALTERNATIVE 2 AND CORRESPONDING AGENCY LOCAL REALIGNMENT SEGMENT

	Alternative 2				Agency-proposed Local Realignment Segment			
	Parallel[a]	Perpendicular[b]	Diagonal[c]	Total	Parallel[a]	Perpendicular[b]	Diagonal[c]	Total
Segment A1 — West Great Falls								
Irrigated	--	--	--	--	--	--	--	--
Non-irrigated	5.4	1.0	10.8	17.2	6.6	1.6	3.5	11.7
Rangeland/ Native	1.0	1.0	6.5	8.5	1.9	2.7	10.7	15.3
Other	0	0.9		0.9	0.1	--	0.1	0.2
Total Miles	**6.4**	**2.9**	**17.3**	**26.6**	**8.6**	**4.3**	**14.3**	**27.2**
Segment A2 — Great Falls Shooting Sports Complex								
Irrigated	-	-	-	-	-	-	-	-
Non-irrigated	1.7	0.5	0.2	2.4	1.7	0.1	0.6	2.4
Rangeland/ Native	1.1	0.0	0.7	1.8	1.1	--	0.7	1.8
Other	0.0	0.0	0.0	0.0	--	--	--	--
Total Miles	**2.8**	**0.5**	**0.9**	**4.2**	**2.8**	**0.1**	**1.3**	**4.2**
Segment B1 — Diamond Valley Right Angle								
Irrigated	--	--	--	--	--	--	--	--
Non-irrigated	--	--	3.7	3.7	2.5	2.9	--	5.4
Rangeland/ Native	--	--	0.3	0.3	--	0.4	--	0.4
Other	--	--	--	--	--	0.1	--	0.1
Total Miles	**--**	**--**	**4.0**	**4.0**	**2.5**	**3.4**	**--**	**5.9**
Segment B2 — Diamond Valley Diagonal-Teton River								
Irrigated	0.0	0.0	0.0	0.0	-	-	-	-
Non-irrigated	0.0	0.0	5.2	5.2	0.5	0.8	3.7	5.0
Rangeland/ Native	0.0	0.0	0.8	0.8	0.2	0.5	0.7	1.4
Other	0.0	0.0	0.2	0.2	0.0	0.0	0.1	0.1
Total Miles	**0.0**	**0.0**	**6.2**	**6.2**	**0.7**	**1.3**	**4.5**	**6.5**
Segment C1 — Brady Frontage								
Irrigated	--	--	--	--	--	--	--	--
Non-irrigated	--	0.5	12.1	12.6	--	3.8	5.5	9.3
Rangeland/ Native	--	0.1	0.6	0.7	--	0.8	0.0	0.8
Other	--	--	0.2	0.1	--	--	4.9	4.9
Total Miles	**--**	**0.6**	**12.9**	**13.4**	**--**	**4.6**	**10.4**	**15.0**

TABLE A3
MILES OF PARALLEL, PERPENDICULAR, AND DIAGONAL ACROSS CROPLAND AND RANGELAND ALTERNATIVE 2 AND CORRESPONDING AGENCY LOCAL REALIGNMENT SEGMENT

	Alternative 2				Agency-proposed Local Realignment Segment			
	Parallel[a]	Perpendicular[b]	Diagonal[c]	Total	Parallel[a]	Perpendicular[b]	Diagonal[c]	Total
Segment C2 — Conrad Realignment								
Irrigated	0.9	--	0.0	0.9	1.2	0.5	-	1.7
Non-irrigated	3.3	--	23.2	26.6	14.8	6.5	5.3	26.6
Rangeland/ Native	0.6	--	3.9	4.5	1.1	1.2	9.8	12.1
Other	0.1	--	0.9	0.9	0.2	-	0.4	0.6
Total Miles	**4.9**	**0.0**	**28.0**	**32.9**	**17.3**	**8.2**	**15.5**	**41.0**
Segment D — Belgian Hill								
Irrigated	0.4	--	--	0.4	--	--	--	--
Non-irrigated	1.0	--	0.6	1.6	2.8	--	--	2.8
Rangeland/ Native	0.2	--	0.1	0.1	--	--	--	--
Other	0.1	--	--	0.1	--	--	--	--
Total Miles	**1.7**	**0**	**0.7**	**2.4**	**--**	**--**	**--**	**2.8**
Segment E — South of Cut Bank								
Irrigated	--	--	--	--	--	--	--	--
Non-irrigated	0.7	--	--	0.7	--	--	0	--
Rangeland/ Native	0.8	--	0.8	0.8	2.4	--	--	2.4
Other	--	--	--	0	--	--	--	--
Total Miles	**1.5**	**0**	**0.8**	**1.5**	**--**	**--**	**--**	**2.4**

Notes:

[a] parallel to north and south

[b] perpendicular to north and south

[c] diagonal to north and south

-- Not applicable

Sources: Orthophotographs 2005 (Montana NRIS 2006a); MATL 2006b; field verification; photographic interpretation .

The following observations were made:

- Segment A1 (West Great Falls) is 0.6 miles longer than the segment it would replace in Alternative 2, however, it reduces the diagonal crossing of cropland from 10.8 miles to 3.5 miles.
- Segment A2 (Great Falls Shooting Sports Complex) increases the diagonal crossing of non-irrigated cropland from 0.2 in Alternative 2 to 0.6 miles in Alternative 4.
- Segment B1 (Diamond Valley Right Angle) is 1.9 miles longer than the segment it would replace in Alternative 2, however, it eliminates diagonal crossing of cropland, compared to 3.7 miles of diagonal crossing in Alternative 2 for this segment and moves the transmission line alignment onto existing utility corridors or other land uses (non-farm).
- Segment B2 (Diamond Valley Diagonal - Teton River) is 0.3 miles longer than the segment of Alternative 2 it would replace, but it reduces the diagonal crossing of cropland from 5.2 miles to 3.7 and shifts the crossing to parallel (0.5 miles) or perpendicular (0.8 miles).
- Segment C1 (Brady Frontage) is 1.6 miles longer than the segment it would replace in Alternative 2. It would reduce the diagonal crossing of cropland from 12.1 miles to 5.5 miles.
- Segment C2 (Conrad Realignment) is nearly 8 miles longer than the segment of Alternative 2 it would replace (41 miles compared to 32.9 miles), however, it would substantially reduce the diagonal crossing of cropland from 23.2 miles to 5.3 miles. Most (14.8 miles) of the cropland crossed would be parallel to the north-south orientation of crop rows. Approximately 6.5 miles would be crossed perpendicular to the rows. Additionally, more of the alignment (12.1 miles) would cross native vegetation or rangeland, compared to Alternative 2 which has 4.5 miles crossing those vegetation types.
- Segment D (Belgian Hill) is 0.4 miles longer than the segment it would replace in Alternative 2, however, it would remove all the diagonal crossing of cropland in this segment and increase the distance of parallel crossing from 1.4 miles to 2.8 miles. The parallel crossings or alignment near the edges of the fields would not interfere with farming activities as much as diagonal crossings.
- Segment E (South of Cut Bank) is 0.9 miles longer than the segment it would replace in Alternative 2, however, it would remove all crossings of cropland (including diagonal) and move the alignment onto native or rangeland vegetation.

Table A4 compares how many miles of transmission line cross CRP land or cropland under each agency-proposed local realignment segment and how many acres would be affected. Segments B1, C2, and D would result in a slight increase in acres removed from production because of the longer length of the line under these segments (see **Table A4)**.

TABLE A4
Acres of Production in CRP or Cropland Affected by Monopole Structures in Agency-proposed Local Realignments Compared to Alternative 2

	Alternative 2		Agency-proposed Local Realignment	
Segment	**Miles**	**Acres[a]**	**Miles**	**Acres[a]**
A1 West Great Falls	17.2	1.8	11.7	1.2
A2 Great Falls Shooting Sports Complex	2.4	0.3	2.4	0.3
B1 Diamond Valley Right Angle	3.7	0.4	5.4	0.6
B2 Diamond Valley Diagonal-Teton River	5.2	0.5	5.0	0.5
C1 Brady Frontage	12.6	1.3	9.3	1.0
C2 Conrad Realignment	27.5	2.8	28.3	3.0
D Belgian Hill	2.0	0.2	2.8	0.3
E South of Cut Bank	0.7	0.1	0.0	0.0

Notes:

[a] Acres rounded to nearest 0.01. Calculation based on 0.01 acres per structure at a structure every 500 feet (10.5 structures per mile)

Sources: Orthophotographs, 2005 (Montana NRIS 2006a), NRIS 2000, MATL 2006b; field verification; photographic interpretation

Some segments (B1 - Diamond Valley Right Angle, C1 – Conrad Realignment and D - Belgian Hill) increase the length of power line crossing farmland and CRP slightly (see **Table A4**) over Alternative 2 for those segments.

Conservation Easements and Special Management Areas

Linear miles of lands under federal/state special management and those lands currently under federal or state conservation easements (wetland easements, CRP, and FWP easements) are summarized in **Table A5** for each alignment. Segments A1 and A2 would eliminate crossing the Great Falls Shooting Sports Complex. Some agency-proposed local realignments would increase the number of miles crossing CRP over corresponding Alternative 2 segments they would replace.

TABLE A5 MILES OF FEDERAL/STATE SPECIAL MANAGEMENT AREAS AND CONSERVATION EASEMENTS CROSSED			
	Alternative 2 Corresponding Segment	**Alternative 3**	**Agency-proposed Local Realignments**
State Land (FWP) – Great Falls Shooting Sports Complex			
Segment A1 (West Great Falls)	0.73	--	0
Segment A2 (Great Falls Shooting Sports Complex)	0	0.51	0.76
Segment B1 (Diamond Valley Right Angle)	--	--	--
Segment B2 (Diamond Valley Diagonal-Teton River)	--	--	--
Segment C1 (Brady Frontage)	--	--	--
Segment C2 (Conrad Realignment)	--	--	--
Segment D (Belgian Hill)	--	--	--
Segment E (South of Cut Bank)	--	--	--
Montana State Trust Land (DNRC)			
Segment A1 (West Great Falls)	3.69	--	2.56
Segment A2 (Great Falls Shooting Sports Complex)	0.12	--	0.08
Segment B1 (Diamond Valley Right Angle)	0.00	--	0.00
Segment B2 (Diamond Valley Diagonal-Teton River)	1.24	--	1.24
Segment C1 (Brady Frontage)	1.14	--	2.68
Segment C2 (Conrad Realignment)	1.70	--	4.03
Segment D (Belgian Hill)	0.00	--	0.00
Segment E (South of Cut Bank)	0.00	--	0.00
Conservation Easements			
Segment A1 (West Great Falls)	(CRP) 5.32 (Stewardship) 0.12	--	10.04
Segment A2 (Great Falls Shooting Sports Complex)	0.00	--	0.00
Segment B1 (Diamond Valley Right Angle)	0.00	--	0.00
Segment B2 (Diamond Valley Diagonal-Teton River)	1.54	--	1.54
Segment C1 (Brady Frontage)	0.00	--	3.10
Segment C2 (Conrad Realignment)	2.16	--	4.17
Segment D (Belgian Hill)	1.36	--	1.48
Segment E (South of Cut Bank)	1.04	--	0.90

Notes:
-- = not applicable

Planned Land Use

The Segment A1 West Great Falls local alignment crosses the planned Kyles Addition subdivision. No residences are under construction or completed in this subdivision.

Wetlands Segment Analysis

The length of each segment and the wetlands affected by each segment are shown in **Table A6**, along with the length of the corresponding segment of Alternative 2 which it could replace.

TABLE A6
WETLANDS AFFECTED BY SEGMENTS
AGENCY-PROPOSED LOCAL REALIGNMENT

Alternative Comparison	Segment Length	Palustrine PEM	Palustrine PUS, PUB, & PAB	Lacustrine	Riverine	Total
	(miles)	(acres)	(acres)	(acres)	(acres)	(acres)
West Great Falls Segment A1	27.3	13.25	0.43	0.0	0.0	13.68
Corr. Alt. 2 Segment	26.8	15.72	1.07	0.78	0.0	17.57
Great Falls Shooting Sports Complex Segment A2	4.2	0.0	0.13	3.21	0.0	3.34
Corr. Alt. 2 Segment	5.0	4.13	0.0	0.78	0.0	4.91
Diamond Valley Right Angle Segment B1	5.9	<1 Est.	ND	ND	<1 Est.	ND
Corr. Alt. 2 Segment	4.2	<1 Est.	ND	ND	<1 Est.	ND
Diamond Valley Diagonal-Teton River Segment B2	6.5	1-2	ND	ND	2-3	ND
Corr. Alt. 2 Segment	5.9	1-2	ND	ND	2-3	ND
Brady Frontage Segment C1	15.0	0.0	0.0	0.0	0.0	0.0
Corr. Alt. 2 Segment	13.3	10.12	1.98	0.0	0.0	12.10
Conrad Realignment Segment C2	41.0	18.10	2.01	0.0	0.0	20.11
Corr. Alt. 2 Segment	33.0	13.75	1.98	0.0	0.0	15.73
Belgian Hill Segment D	2.8	0.0	0.0	0.0	0.0	0.0
Corr. Alt. 2 Segment	2.4	0.0	0.41	0.0	0.0	0.41
South of Cut Bank Segment E	2.5	0.0	0.0	0.0	0.0	0.0
Corr. Alt. 2 Segment	2.3	0.0	0.0	0.0	0.0	0.0

Notes:

Alt. Alternative
Corr. Corresponding
PEM Palustrine Emergent wetlands
PUS Palustrine Unconsolidated Shore wetlands
PUB Palustrine Unconsolidated Bottom wetlands
PAB Palustrine Aquatic Bed wetlands
Est. estimated using the 2005 aerial photographs
ND No Data

Potential impacts to wetlands for all eight local realignment segments were evaluated using the wetland data provided in **Table A6**. Total potential wetlands recorded along each local realignment segment were compared to the total wetlands recorded for the corresponding segment of Alternative 2. The total wetland acres was also segregated into four main wetland categories (2 palustrine classes, 1 lacustrine, and 1 riverine) to better evaluate the types of wetlands that each segment may impact. Total wetland acreage does not include any wetlands that may exist in Teton County for the portion of the segments where no official wetland data currently exist. The 2005 National Agricultural Imagery Program aerial photographs were used to visually identify observable wetlands along the local realignment segments in Teton County and to estimate the approximate number of wetlands for these alignments. Even though the wetland acreage could not be quantified from the aerial photographs, it was determined that no single large wetland or concentration of wetlands existed that could not be spanned using 500 foot span lengths.

Potential impacts to wetlands for the local realignment segments were compared only to the corresponding segments of Alternative 2 for which each could substitute. As was determined for the entire analysis area, the majority of the wetlands along all local realignment segments are classified as palustrine, emergent wetlands (PEM).

Segment A1 (West Great Falls) The A1 segment traverses around the southern and western sides of Benton Lake NWR area and would potentially impact 3.89 fewer acres of wetlands, compared to the corresponding segment of Alternative 2. Several smaller areas with palustrine and lacustrine wetlands exist directly north of Great Falls (Black Horse Lake area) and along the western side of Benton Lake NWR. A1 would impact fewer wetlands primarily because it is located along steeper slopes compared to crossing a more flat bench area. No riverine wetlands are delineated along segment A1 facility location. However, segment A1 crosses the Lake Creek channel in Teton County and could potentially impact a small riverine wetland (possibly about 1 acre) at that location.

Segment A2 (Great Falls Shooting Sports Complex Realignment) This 4.2 mile long segment runs north from the Great Falls 230-kV switch yard along the edge of cropland and parallel to the access road to the Great Falls Shooting Sports Complex. The Segment A2 centerline crosses over an actively used gun club, but would not be located over any existing or planned buildings. The segment A2 facility location would potentially impact 1.57 fewer acres of wetlands compared to the corresponding segment of Alternative 2. The primary difference between these two alignments was that the segment A2 realignment would cross a larger portion of the Black Horse Lake Flat that has been mapped as a lacustrine wetland.

Segment B1 (**Diamond Valley Right Angle)** This 5.9 mile long B1 segment is located in Diamond Valley area of Teton County, approximately 2 to 5 miles south of the Teton River. The types and amounts of wetlands that would be impacted within the 500 foot wide facility location of segment B1 are very similar to those that occur along the 4.2 mile long corresponding Alternative 2 portion. Both segment B1 and the corresponding Alternative 2 centerlines would cross Hunt Coulee; segment B1 would cross this coulee at a straight east to west angle, while the Alternative 2 would cross Hunt Coulee at a southeast to northwest angle. Hunt Coulee has palustrine emergent wetlands (estimated to be less than one acre) and a small area of riverine wetlands (estimated to be less than one acre) in the bottom of the coulee. These wetland areas could be spanned causing minimal impacts to wetlands under both the B1 segment and Alternative 2 alignments.

Segment B2 (Diamond Valley and Teton River) This 6.5 mile long segment B2 is also located in the Diamond Valley area of Teton County, but would utilize the same alignment as Alternative 3 for approximately 3.25 miles where it would parallel the existing NWE 115-kV transmission line. Segment B2 would cross Hunt Coulee approximately ¾ mile north of the Alternative 2 crossing and ¼ mile north of the segment B1 crossing of Hunt Coulee. This alignment would also extend further north and includes a modified crossing of the Teton River that avoids some cropland. The types and amounts of wetlands that would be impacted within the 500 foot wide facility location for segment B2 are very similar to those that occur along the 5.9 mile long corresponding Alternative 2 portion. Both alternative alignments would cross small areas with palustrine emergent wetlands (estimated at one to two acres) and a small area of riverine wetlands (estimated at two to three acres) in the bottom of Hunt Coulee and the Teton River. All wetland areas visually identified on the 2005 aerial photographs for segment B2 could be spanned.

Segment C1 (Brady Frontage Road) Segment C1 is a 15.0 mile long alignment that runs directly east - west along the northern edge of the Teton River bank and then parallels the Interstate 15 frontage road for approximately 11 miles, connecting back with the Alternative 2 alignment just north of Brady, Montana. Segment C1 would potentially impact 12.1 fewer acres of wetlands compared to the Alternative 2 alignment through this area. There are no wetlands of any type mapped along the Brady Frontage Road alignment. Several areas with palustrine wetlands (total of 12.1 acres) exist along the corresponding segment of Alternative 2 through this area.

Segment C2 (Conrad Realignment) Segment C2 is a 41.0 mile long alignment that runs around the Town of Conrad on the east and north sides. Segment C2 takes off from Alternative 2 at the same location as segment C1. Both Alternative C1 and C2 segments would be in the same alignment for approximately 3.25 miles where segment C2 would begin to run north. This alternative alignment would travel north for approximately 20 miles where it would turn west and continue for approximately 18 miles where it

would rejoin Alternative 2. This alternative alignment would cross several major coulees (South Pondera, Pondera, Favot, and Big Flat) and the Dry Fork Marias River.

Segment C2 would potentially impact 4.38 more acres of total wetlands compared to the corresponding Alternative 2 alignment through this area. The main reason for the increased number of wetlands crossed by segment C2 is the higher proportion of coulees and unfarmed drainages that were used by this alternative in the avoidance of farmed land. Small areas with palustrine and riverine wetlands exist along most of the major coulees and along the Dry Fork Marias River crossing. Segment C2 also crosses slightly larger and more defined drainages due to its more eastern location. Drainages generally flow west to east in this area and tend to have more defined channels as they flow toward the Missouri River.

Segment D (Belgian Hill) Segment D is a relatively short (2.8 mile) alignment located in the Belgian Hill area. This alternative segment generally parallels Alternative 2, but is located approximately ½ mile to the west. This alignment segment was developed primarily to minimize visual impacts to four residences located along the Alternative 2 alignment. Segment D would potentially impact 0.41 fewer acres of palustrine wetlands compared to Alternative 2 through this locale.

Segment E (South of Cut Bank) Segment E is a relatively short (2.5 mile) segment located in an area southeast of Cut Bank. This alternative segment also parallels the Alternative 2 alignment approximately ½ mile to the west. This alignment segment was developed primarily to minimize visual impacts to residences located along the Alternative 2 alignment and to avoid paralleling a buried gathering pipeline for the oil wells in the local area. There are no mapped wetlands along either segment E or the corresponding Alternative 2 alignment in this locale.

Vegetation Segment Analysis

Rangeland vegetation, such as grassland, improved pasture, seeded grasslands, shrubland, badland, riparian and wetlands, and forested cover types, would be removed by the construction of access roads and structures, and at construction staging areas. Maintenance activities would not likely result in additional ground disturbance. Linear miles of rangeland cover types affected by alternative are presented in **Table A7**. Disturbance resulting from staging areas would be similar for Alternatives 2 and 3.

Agency-proposed local realignment segments total approximately 38.5 miles. The comparable segments of Alternative 2 total almost 20 miles (**Table A8**), nearly doubling the grassland the rangeland cover types under alternative segments. The increased crossing in rangeland cover types would result in more tower structures and access roads, thus increasing rangeland impacts. Disturbance due to maintenance activities would also increase over the life of the project due to increased structure and road

placement in rangeland and vegetation (**Table A9**). Disturbance resulting from staging areas would be similar to those of Alternatives 2 and 3.

TABLE A7
Native Vegetation Cover Types Crossed by Alternatives 2, 3, and 4

Rangeland Cover Types	Alternative 2		Alternative 3		Agency-proposed Local Realignments	
	Miles	Total Land Cover (percent)	Miles	Total Land Cover (percent)	Miles	Total Land Cover (percent)[a]
Grassland/ Shrubland	33.6	25.9	21.6	17.8	A1 = 15.3 A2 = 1.8 B1 = 0.4 B2 = 1.3 C1 = 0.8 C2 = 12.0 D = 2.8 E = 2.5	A1 = 56.2 A2 = 42.2 B1 = 7.3 B2 = 19.9 C1 = 5.2 C2 = 29.1 D = 99.0 E = 100.0
Riparian	1.9	1.5	1.3	1.1	A1 = 0.2 A2 = 0.03 B1 = 0.1 B2 = 0.2 C1 = 0.05 C2 = 1.0 D = 0.04 E = 0.0	A1 = 0.7 A2 = 0.7 B1 = 2.2 B2 = 2.8 C1 = 0.3 C2 = 2.3 D = 0.01 E = 0.0
Forest (Cottonwood)	0.0	0.0	0.1	0.1	B2 = 0.04[b]	B2 = 0.6
Total	35.5	27.4	23.0	19.0	--	--
Total Line Length	129.9	--	121.6	--	--	--

Notes:
a Percent of segment..
b Found only in segment B_2
Source: Orthophotographs 2005 (Montana NRIS 2006a) analysis of land cover in vegetation analysis area, October 2006.
-- not applicable

TABLE A8
LINEAR MILES OF VEGETATION CHANGE BETWEEN ALTERNATIVE 2 AND AGENCY-PROPOSED LOCAL REALIGNMENTS

Native Vegetation Cover Types	Alternative 2 (miles)	Agency-proposed Local Realignments (miles)
Rangeland	A1 = 8.5 A2 = 1.8 B1 = 0.3 B2 = 0.8 C1 = 0.6 C2 = 4.5 D = 0.3 E = 1.6	A1 = 15.3 A2 = 1.8 B1 = 0.4 B2 = 1.3 C1 = 0.8 C2 = 12.0 D = 2.8 E = 2.5
Riparian	A1 = 0.0 A2 = 0.0 B1 = 0.2 B2 = 0.2 C1 = 0.1 C2 = 0.8 D = 0.1 E = 0.0	A1 = 0.2 A2 = 0.03 B1 = 0.1 B2 = 0.2 C1 = 0.05 C2 = 1.0 D = 0.04 E = 0..0
Forest (Cottonwood)	No Data	B2 = 0.4 [a]

Note:
a Found only in segment B_2
Source: Orthophotographs 2005 (Montana NRIS 2006a) of land cover in vegetation analysis area, October 2006

TABLE A9
ESTIMATED ACRES OF DISTURBANCE DUE TO H-FRAME STRUCTURES IN RANGELAND VEGETATION

Rangeland Cover Types	Alternative 2			Agency-proposed Local Realignments		
	Miles[a]	Number of Structures[b]	Acres[c]	Miles	Number of Structures	Acres
Grassland/ Shrubland	18.4	121	0.1	36.9	244	0.2
Riparian	1.4	9	<0.01	1.6	11	<0.01
Total	19.8	130	0.1	38.5	255	0.2

Notes:
a Segment total.
b Average 800-foot span between H-frame structures.
c Based on 36 square feet occupied by an H-frame structure.

Riparian Vegetation
The effects to riparian vegetation from the agency-proposed local realignments would be similar to those of Alternative 2 because both alternatives cross similar amounts of riparian habitat (**Table A9**).

Species of Concern
The effects on species of concern from agency-proposed local realignments would be the same as Alternative 2 because both alternatives cross similar amounts of riparian habitat where these species are likely to occur (**Table A10**).

Weed Control
The agency-proposed local realignments would cross more native vegetation than Alternative 2 (**Table A8**). This increase in land area potentially exposed to disturbance and noxious weed invasion would require greater diligence, expense, and coordination to successfully implement a noxious weed control plan (**Table A9**). The MATL Noxious Weed and Invasive Plant Control Plan (**Appendix C**) would adequately reduce the increased risk of noxious weed spread in the analysis area.

Wildlife Segment Analysis

Big Game Species
Impacts on big game species would not be expected. Pronghorn and mule deer does with fawns could be displaced by activities during late spring and early summer, but disturbance within a given portion of the line would be temporary and animals could easily use adjacent habitat during disturbance periods. Activities would not disturb wintering animals as the construction activities would occur during the spring and summer months. The proposed and alternative transmission line alignments would cross through mule deer winter range and there would be some permanent loss of habitat as a result of structures and access roads (see **Table A10).** This habitat loss would not impact mule deer as this is a minor loss relative to the amount of available habitat within the region.

TABLE A10 MULE DEER WINTER RANGE IMPACTED BY ALTERNATIVES				
MULE DEER WINTER RANGE	Alternative			
	2	3	2 Corresponding to Agency-proposed Local Realignments[a]	Agency-proposed Local Realignment by Segments[b]
Miles of Mule Deer Winter Range Bisected by Transmission Line	Alternative 2 Segment A 19	20	A1 = 1.8 A2 = 1.8 B1 = 0 B2 = 1.0 C1 = 0.67 C2 = 9.3 D = 0 E = 0	A1 = 4.2 A2 = 1.8 B1 = 0.9 B2 = 3.0 C1 = 4.8 C2 = 8.8 D = 0 E = 0

Notes:
a Segment of the Alternative 2 alignment that corresponds with the agency-proposed local realignment segment.
b Agency-proposed local realignment segments that correspond to the Alternative 2 segments.

Threatened and Endangered Segment Analysis

The alternative alignments traverse the known habitat range of four Species of Concern and one federally threatened species. **Table A11** lists the linear miles of special status species' habitat range along each of the two action alternatives and local realignments.

TABLE A11 LINEAR MILES OF SPECIAL STATUS SPECIES' HABITAT RANGE BY ALTERNATIVE AND AGENCY-PROPOSED LOCAL REALIGNMENTS					
Common Name	**State Rank**	**Alternative**			
		2	3	2 Corresponding to Agency-proposed Local Realignments[a]	Agency-proposed Local Realignment by Segments[b]
Black-crowned night-heron	S3B	11.2	9.1	A1 = 11.2 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 2.6 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0
Black-necked stilt	S3, S4B	11.2	9.1	A1 = 11.2 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 2.6 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0

TABLE A11
LINEAR MILES OF SPECIAL STATUS SPECIES' HABITAT RANGE BY ALTERNATIVE AND AGENCY-PROPOSED LOCAL REALIGNMENTS

Common Name	State Rank	Alternative			
		2	3	2 Corresponding to Agency-proposed Local Realignments[a]	Agency-proposed Local Realignment by Segments[b]
Burrowing owl	S2B	4.2	3.9	A1 = 4.2 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 0 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0
Ferruginous hawk	S2B	6.5	0	A1 = 6.5 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 5.8 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0
Peregrine falcon	S2B	2.5	2.2	A1 = 0 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 0 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0
Total for All species	--	19.9	11.3	A1 = 17.7 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 8.4 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0

Notes:

Source: MTNHP. 2005. GIS Analyses of Element Occurrence Data. Montana Natural Heritage Program, Helena, Montana. Available at: **http://nhp.nris.state.mt.us/mbd**

State: S2 = Imperiled because of rarity, or because of other factors demonstrably making it very vulnerable to extinction throughout its range; B = a state rank modifier indicating breeding status for a migratory species; S3 = vulnerable because of rarity, or found in restricted range even though it may be abundant at some of its locations; S4 = apparently secure, though it may be quite rare in parts of its range, especially at the periphery; S1 = critically imperiled because of extreme rarity, or because of some factor of its biology making it especially vulnerable to extirpation; SH = Historical, known only from records over 50 years ago; may be rediscovered; N = non-breeding.

a Segment of the Alternative 2 alignment that corresponds with the agency-proposed local realignment segment.
b Agency-proposed local realignment segments that correspond to the Alternative 2 segments.

Socioeconomics Segment Analysis

The socioeconomic impacts described above are essentially equal for all of the alternatives and segments with the exception of differences in the estimated property tax revenue available to each affected county depending on the mileage of the line that would ultimately be constructed within each county's jurisdiction (**Table A12**).

Cultural Resources Segment Analysis

The Class 1 cultural resource searches resulted in the identification of three previously recorded sites considered eligible for the NRHP in sections along the agency-proposed local realignment segments. These sites include the Rainbow Dam Road, an historic transmission line, and the Burlington Northern-Santa Fe Railroad. There are 20 sites where NRHP-eligibility has not been determined, is unknown, or is unresolved. This group includes six tipi ring sites, two lithic scatter sites, two prehistoric camp sites, an historic road or trail, five homesteads, two historic irrigation systems, one historic trash dump, and one historic mining site.

Two NRHP-eligible sites, 24CA416 the Rainbow Dam Road and 24CA1040 an historic transmission line just north of the Missouri River, are located in sections containing both segment A1 and segment A2. The sections crossed by segment A1 contains three of the tipi ring sites, the two lithic scatter sites, the two prehistoric camp sites, three of the homesteads, and the historic mining site in the category of undetermined, unknown, or unresolved NRHP eligibility.

There are no previously recorded cultural resource sites in sections along either segment B1 or segment B2.

One section along segment C1 contains one tipi ring site of undetermined NRHP eligibility. Several sections along segment C2 contain two of the tipi ring sites, two of the homesteads, one of the historic irrigation systems, and the one historic trash dump in the category of undetermined, unknown, or unresolved NRHP eligibility.

Two sections along segment D contain the historic road or trail and one of the historic irrigation systems both of undetermined NRHP eligibility. Two sections along segment E contain the NRHP-eligible Site 24GL191, the Great Northern Railroad – now part of the Burlington Northern-Santa Fe.

TABLE A12 TAX BENEFIT ESTIMATES FOR ALTERNATIVES AND SEGMENTS							
	Alignment Length (Miles)	**Value $/Mi.**	**Estimated Value in County (BxC)**	**Class 9 Tax Rate (Valuation Ratio): 12%**	**Taxable Value (DxE)**	**Avg. Rural Mill Levy**	**Property Tax (FxG)**
Cascade							
Alternative 2	12.76	$363,284	$4,635,504	0.12	$556,260	0.50412	$280,422
Alternative 3	12.31	$363,284	$4,472,026	0.12	$536,643	0.50412	$270,533
Alternative 4							
Segment A1 - Alt 2	12.75	$363,284	$4,631,871	0.12	$555,825	0.50412	$280,202
Segment A1 - Alt 4	19.8	$363,284	$7,193,023	0.12	$863,163	0.50412	$435,138
Chouteau							
Alternative 2	5.87	$363,284	$2,132,477	0.12	$255,897	0.43959	$112,490
Alternative 3	10.21	$363,284	$3,709,130	0.12	$445,096	0.43959	$195,660
Alternative 4							
Segment A1 - Alt 2	5.87	$363,284	$2,132,477	0.12	$255,897	0.43959	$112,490
Segment A1 - Alt 4	0	$363,284	$0	0.12	$0	0.43959	$0
Glacier							
Alternative 2	40.41	$363,284	$14,680,306	0.12	$1,761,637	0.53745	$946,792
Alternative 3	37.34	$363,284	$13,565,025	0.12	$1,627,803	0.53745	$874,863
Alternative 4	40.41	$363,284	$14,680,306	0.12	$1,761,637	0.53745	$946,792
Pondera							
Alternative 2	45.69	$363,284	$16,598,446	0.12	$1,991,814	0.52162	$1,038,970
Alternative 3	44.44	$363,284	$16,144,341	0.12	$1,937,321	0.52162	$1,010,545
Alternative 4							
Segment C1 - Alt 2	4.11	$363,284	$1,493,097	0.12	$179,172	0.52162	$93,460
Segment C1 - Alt 4	7.12	$363,284	$2,586,582	0.12	$310,390	0.52162	$161,906
Segment C2 - Alt 2	28.86	$363,284	$10,484,376	0.12	$1,258,125	0.52162	$656,263
Segment C2 - Alt 4	34.66	$363,284	$12,591,423	0.12	$1,510,971	0.52162	$788,153

TABLE A12
TAX BENEFIT ESTIMATES FOR ALTERNATIVES AND SEGMENTS

	Alignment Length (Miles)	Value $/Mi.	Estimated Value in County (BxC)	Class 9 Tax Rate (Valuation Ratio): 12%	Taxable Value (DxE)	Avg. Rural Mill Levy	Property Tax (FxG)
Teton							
Alternative 2	25.16	$363,284	$9,140,225	0.12	$1,096,827	0.4991	$547,426
Alternative 3	17.32	$363,284	$6,292,079	0.12	$755,049	0.4991	$376,845
Alternative 4							
Segment A1 - Alt 2	8.13	$363,284	$2,953,499	0.12	$354,420	0.4991	$176,891
Segment A1 - Alt 4	7.47	$363,284	$2,713,731	0.12	$325,648	0.4991	$162,531
Segment C1 - Alt 2	4.12	$363,284	$1,496,730	0.12	$179,608	0.4991	$89,642
Segment C1 - Alt 4	7.89	$363,284	$2,866,311	0.12	$343,957	0.4991	$171,669
Segment C2 - Alt 2	4.12	$363,284	$1,496,730	0.12	$179,608	0.4991	$89,642
Segment C2 - Alt 4	6.29	$363,284	$2,285,056	0.12	$274,207	0.4991	$136,857
Notes:							
Sources: Mullen 2006							
Montana Department of Revenue 2004							

Notes:
a Mullen 2006
b Montana Department of Revenue 2004
$/Mi. = dollars per mile

Visuals Segment Analysis

Alternative 4 was developed by comparing eight segments that originated and ended at various locations off of Alternative 2 (**Table A13**). Compared to the corresponding segment from Alternative 2, there are fewer residences in the immediate foreground and foreground (0 to ¼ mile and ¼ to ½ mile) of segments A1, A2, B1, B2, C2, and D compared to the corresponding Alternative 2 segments. The differences are all fewer than 5 residences, except A1 (A1 = 13 and corresponding Alternative 2 A1 = 28). Segment E and the corresponding Alternative 2 segment are the same. Segment C1 has a considerably more residences than the corresponding Alternative 2 segment (C1 = 66 versus corresponding Alternative 2 = 0).

Travel corridor comparison (½ to 1 mile) shows that segments A1, A2, and D have a shorter lineal mileage from the major travel routes in the area than do the corresponding Alternative 2 segments. Segment A1 is approximately 3 miles shorter than its corresponding Alternative 2 segment and the other segments are within 1.5 lineal miles of their corresponding Alternative 2 segments. Segment C1 has a considerable amount more lineal mileage within ½ to 1 mile than the corresponding Alternative 2 segment (C1 = 12.38 miles versus corresponding Alternative 2 C1 = 4.83 miles).

All recreation sites were not compared, but those that were are similar in visual impacts.

In summary, segment A1 has less of a visual impact than the corresponding Alternative 2 segment. The corresponding Alternative 2 segment C1 has considerably smaller visual impact than the segment C1. Transmission line alignments in segments D and E were located in consultation with local residents to reduce visual impacts.

TABLE A13
Comparison of Visual Impacts
Alternative 2, 3, and 4 Segments

Alternative	Segment	Number of Residences (Points)			Recreation – Benton Lake (Miles)	Recreation – State Lands[a] (Miles)	Recreation – Lewis & Clark Trail (Lineal Mileage)			Travel Corridor[b] (Lineal Mileage)
		0 to ¼	¼ to ½	½ to 1	Within One Mile	Miles Crossed	0 to ¼	¼ to ½	½ to 1	½ to 1
2		30	60	91	9.42	0.73	7.94	3.39	6.90	19.61
3		34	71	124	8.90	0.49	7.72	2.30	4.96	21.39
4	A1	10	3	29	--	0.77	0.50	0.52	1.07	4.17
	A2	5	8	4	--	--	--	--	--	2.00
	B1	1	0	2	--	--	--	--	--	--
	B2	2	0	1	--	--	--	--	--	--
	C1[c]	9	57	41	--	--	0.64	0.55	0.89	12.38
	C2[c]	8	16	22	--	--	0.50	0.51	0.79	3.34
	D	4	1	2	--	--	--	--	--	2.50
	E	2	3	3	--	--	0.47	0.50	0.50	1.14
2	A1	9	19	34	--	0.73	0.74	1.15	2.05	7.95
	A2	5	10	13	--	--	--	--	--	3.17
	B1	2	0	1	--	--	--	--	--	--
	B2	2	0	1	--	--	--	--	--	--
	C1	0	0	0	--	--	0.70	1.00	1.38	4.83
	C2	9	20	10	--	--	0.70	1.00	1.38	1.88
	D	4	0	2	--	--	--	--	--	2.45
	E	2	3	4	--	--	--	--	--	1.14

Notes:
a Does not include the conservation easement located north of the Missouri River at Great Falls Substation (Lewis and Clark Greenway Conservation Easement)
b Interstate 15, U.S. Highways 2 and 87, and Montana State Highway 44
c C1 and C2 do not have the same endpoints.
-- not available